

HW: p. 85 : 40, 41,
42, 46

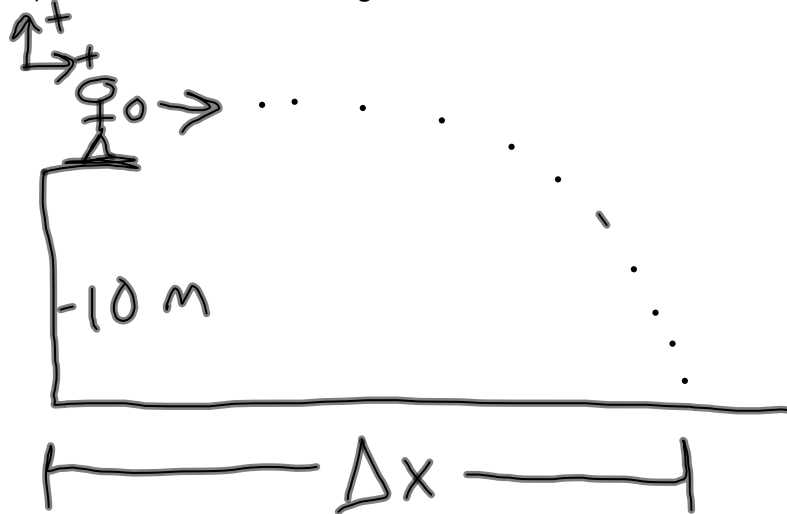
TEST Tuesday 2/28

Projectile Motion Practice Problems 2.21.12 CP Physics

A man stands on a balcony that is 10 m high and throws a ball horizontally with a velocity of 12 m/s.

a) How long does it take for the ball to hit the ground?

b) How far does the ball go in the x-direction from directly below the balcony?



$$v_{iy} = 0 \text{ m/s}$$

$$v_{ix} = 12 \text{ m/s}$$

$$\Delta y = 10 \text{ m}$$

$$a) \quad \Delta y = v_{iy}t + \frac{1}{2}a_yt^2$$

$$t = \sqrt{\frac{2\Delta y}{a_y}}$$

$$= \sqrt{\frac{2(-10 \text{ m})}{(-9.8 \text{ m/s}^2)}}$$

$$= 1.43 \text{ s}$$

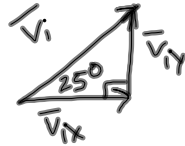
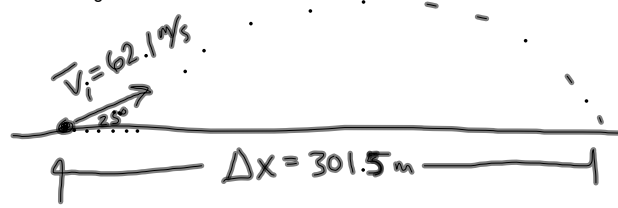
$$b) \quad \Delta x = v_{ix}t$$

$$= (12 \text{ m/s})(1.43 \text{ s})$$

$$= 17.2 \text{ m}$$

Projectile Motion Practice Problems 2.21.12 CP Physics

A golfer hits a golf ball at an angle of 25.0 degrees to the ground with an initial velocity of 62.1 m/s. If the golf ball covers a horizontal distance of 301.5 m, what is the ball's maximum height?



1) find \bar{v}_{ix} and \bar{v}_{iy}

$$v_{ix} = v_i \cos(25^\circ) = 56.3 \text{ m/s}$$

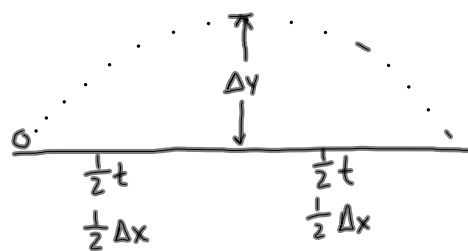
$$v_{iy} = v_i \sin(25^\circ) = 26.24 \text{ m/s}$$

2) find time to travel Δx

$$\Delta x = v_{ix} t$$

$$t = \frac{\Delta x}{v_{ix}} = \frac{301.5 \text{ m}}{56.3 \text{ m/s}} = 5.36 \text{ s}$$

* For symmetric problems (ball lands at same height it started), $\frac{1}{2}$ time is place of maximum height. $\rightarrow \frac{1}{2} \Delta x$



3) find $\Delta y \rightarrow v_{fy}$ at max. height = 0 m/s!

$$v_{fy}^2 = v_{iy}^2 + 2a_y \Delta y$$

$$\Delta y = \frac{-v_{iy}^2}{2a_y} = \frac{-(26.25 \text{ m/s})^2}{2(-9.8 \text{ m/s}^2)} = 35.2 \text{ m}$$